GULL-BILLED TERN (*Sterna nilotica*)

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Criteria Scores

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
15	0	10	10	5	10	10

Special Concern Priority

Currently considered a Bird Species of Special Concern (breeding), Highest Priority. Included on CDFG's (1992) unprioritized list and on Remsen's (1978) original list as Second Priority.

Breeding Bird Survey Statistics for California

Data inadequate for trend assessment (Sauer et al. 2000).

General Range and Abundance

Cosmopolitan species comprised of up to six subspecies worldwide; breeding highly localized and none are considered to be very abundant (Parnell et al. 1995, Gochfeld and Burger 1996).

Three subspecies in New World: *S. n. vanrossemi,* described by Bancroft (1929) breeds locally in s. California (Salton Sea and south San Diego Bay, Parnell et al. 1995), south to Baja California, Mexico (Cerro Prieto, Molina and Garrett 2001, Isla Montague, in the northern Gulf of California, Palacios and Mellink 1993, Ojo de Liebre lagoon, Danemann and Carmona 2000), and presumably south along coastal w. Mexico (van Rossem 1945, AOU 1957, 1998), although nesting locations not documented previously for Sonora (Russell and Monson 1998) or elsewhere in northwestern Mexico. Colony of approximately 10 pairs only recently documented from n. Sinaloa (Xico Vega, in litt.). Review of breeding seabirds in Baja California and the Gulf of California by Everett and Anderson (1991) indicates that if "*vanrossemi* is extant, it is not abundant". Based on current knowledge of breeding locations in w. North America, subspecies *vanrossemi* is estimated at fewer than 700 pairs (Molina 2000). Small numbers winter in northern Gulf of California, southern

Sonora, at Bahia Tobari and in Nayarit, at San Blas (S. N. G. Howell, pers. comm., Molina pers. obs.). Southern wintering limit poorly known, *vanrossemi* may extend south to Honduras and Costa Rica. Subspecific identification of local, poorly-documented breeding populations in northwestern South America unclear; these may belong to *vanrossemi* (Marchant 1958) or possibly the next subspecies (Blake 1977). *S. n. aranea* breeds locally along the Atlantic and Gulf coasts of the United States and in the Caribbean (Parnell et al. 1995). Estimates of this population ranged from 3000 to 5400 pairs (Parnell et al. 1995), and the species appears to be declining in Virginia and elsewhere (Erwin et al. 1998). Along Atlantic coast *aranea* winters occasionally from N. Carolina, but more regularly from southwestern Florida across Gulf Coast to Mexico (Parnell et al. 1995). Third New World subspecies, *S. n. groenvoldi* has been proposed (Peters 1934) to distinguish breeding populations along coastal Brazil. Population size has not been estimated for this region.

In Old World, nominate *nilotica* breeds throughout Europe, Middle East, n. Africa, nw. China and inner Mongolia (Cramp 1985), with main breeding areas in Mauritania and Russia (Parnell et al. 1995). *S. n. addenda* reported from se. coast of China (Peters 1934). *S. n. macrotarsa* breeds locally in w. Australia (Cramp 1985). Status of fourth Old World subspecies, *S. n. affinis* from e. Asia, se. China and Malaysia, reported by some authors (Parnell et al. 1995), not resolved.

Global population of *S. nilotica* estimated at 55,000 pairs Gochfeld and Burger 1996).

Seasonal Status in California

Occurs primarily as a breeder, arriving early to mid-March and departing by mid September (Parnell et al. 1995, Patten et al. in press). The earliest record was of a single bird at the Salton Sea on 5 March 1995 (Molina, pers. obs.). Rarely occurs as a winter visitor (Garrett and Dunn 1981). Latest observations, also at the Salton Sea, were of single birds -- one on 31 December 1970 (shot by a hunter, K. Garrett pers. obs.) and the other on 18 December 2001 (K. Molina, pers. obs.).

Historical Range and Abundance in California

Grinnell and Miller (1944) considered the Gull-billed Tern as a summer visitant in the extreme southeastern part of state. The only breeding colony, containing approximately 500 pairs in 1927, became established on small sandy islets at the southeast end of the Salton Sea. Based on anecdotal evidence, the colony was thought to have been active since about 1920 (Pemberton 1927).

Recent Range and Abundance in California

As a breeding visitor confined to the Salton Sea in Imperial and Riverside counties, the abundance of the Gull-billed Tern has decreased substantially over the last 50 years with only a slight increase in its breeding range, which now includes a small coastal colony in San Diego Bay. By 1942, the population breeding at Salton Sea had decreased to only 100-200 pairs (L. C. Goldman, in litt.). from an estimate of 500 pairs in 1927 (Pemberton 1927). Despite this initial dramatic decline, the species continued to breed at the Salton Sea, but with less regularity and with further substantial decreases in population size from the 1950s through 1980s. The maximum estimates reported in Field Notes/North American Birds for each decade during this period were nearly 50 pairs in 1959 (AFN 13: 455), 11 pairs in 1961 (AFN 15: 493), up to 40 pairs in 1974 (AB 28: 949), and up to 75 pairs in 1986 (AB 40: 1255). In 1986, one pair colonized the saltworks in south San Diego Bay, establishing the second of only two breeding locations for the state. By 1989 the population size at San Diego increased to 6 pairs (AB 43: 1368). From 1990 through 2001, the mean number of pairs breeding at the Salton Sea and south San Diego Bay were 117 ± 31 (range = 60 to 155 pairs, Molina unpubl. data) and 18 ± 9 (range = 8-30 pairs, R. Patton, unpubl. data), respectively, giving a mean estimate of the entire breeding population in California of just 135 pairs during that period.

Ecological Requirements

Most studies of nesting habitat selection, diet, and foraging behavior for the Gull-billed Tern have been conducted on European populations (Moller 1981, Fasola and Canova 1992). In North America, quantitative studies on breeding habitat use and colony-site dynamics exist primarily for Atlantic coast populations (Erwin 1980, Erwin et al. 1998). Molina (in litt.) reports on patterns of

colony site occupation at the Salton Sea. The Gull-billed Tern is less faithful to nest sites (Erwin et al. 1998) and may be less tolerant of colony intrusion than other terns (Parnell et al. 1995).

In California, the Gull-billed Tern requires isolated nesting habitat such as the small bare islets composed of fine clay soils within impoundments at the Salton Sea, or isolated sections of earthern levees such as those at the saltworks in south San Diego Bay. Vegetation, when present, is sparse. Unlike the California Least Tern (*S. antillarum browni*), it does not utilize beach or other shoreline habitats for nesting. Colonies are usually associated with shallow wetland areas and bays. An opportunistic feeder with a broad diet, Gull-billed Terns forage along inshore marine habitats such as the edges of shallow embayments, over exposed or shallowly flooded mudflats, at the surfline on sandy beaches, along tidal flats, and freshwater drainages and canals, and over agricultural fields and scrub habitats (Parnell et al. 1995). The diet of Gull-billed Terns at the Salton Sea consists of small fish, (particularly juvenile *Tilapia* and *Bairdiella* at the Salton Sea, Molina 2000), a variety of insects (crickets and grasshoppers, Orthoptera; orange sulfurs, *Colias eurytheme*; dragonflies, Odonata; and occasionally cicadas, Homoptera), side-blotched lizards (*Uta stansburiana*) and crayfish (*Procambarus* sp.). At San Diego Bay, the mole crab (*Emerita analoga*) and the side-blotched lizard are common components of the diet. Less frequently taken are the very young chicks of the Least Tern, Snowy Plover (*Charadrius alexandrinus*), and Black-necked Stilt (*Himantopus mexicanus*). The former two are taken only at San Diego Bay; at the Salton Sea, the stilt is rarely preyed upon, despite its frequent nesting association with Gull-billed Terns. On the winter grounds in northern Gulf of California, the Gull-billed Tern forages over exposed mud flats preying on small crabs (*Uca* sp.; pers. obs.)

Threats

The implementation of predator control practices against Gull-billed Terns as a result of perceived and as yet poorly understood impacts of predation by this species on California Least Tern and Snowy Plover young in south San Diego Bay potentially threaten the existence of this species as a

breeder in one of only two colony locations for it in the state. Loss of the few suitably isolated nesting habitats due to the recession of lake surface level and connections to mainland areas threaten the state's largest breeding population at the Salton Sea. Decreases in the areal extent of irrigated farmlands or changes in the distribution of such lands may adversely affect important foraging areas. Diminished water quality or lack of water in the extensive drain network of the Salton Sea will adversely affect important prey populations that occupy drains. Detailed studies of contaminants have not been undertaken at either location. Levels of selected contaminants in a small sample of eggs from the Salton Sea were below those thought to cause obvious reproductive impairment.

Management and Research Recommendations

- Place an immediate moratorium on predator control measures against the tern in San Diego Bay.
- List subspecies *vanrossemi* as a Threatened Species at federal and state levels because of small population size and few known nesting locations (Clapp et al. 1993).
- Protect and maintain all existing nesting habitat; modify existing nesting habitat to enhance substrate and isolation from terrestrial predators and human intruders;
- Establish additional colony sites at north and south ends of the Salton Sea, where crowding and interference by densely aggregated heterospecifics appear to be influencing nesting success, and evaluate feasibility of additional sites at San Diego Bay.
- Identify important nesting locations for the subspecies in northwestern Mexico to completely document breeding range and formulate accurate estimate of population size.
- Protect productive foraging areas that may be especially vulnerable to contamination such as protected inlets, bays and lagoons. Maintain sufficient upland foraging areas (ag and scrub lands in the vicinity of nesting areas.

- Address impacts of water conservation practices and proposed transfers of water from the Imperial Valley and maintain adequate water supplies to the Salton Sea to ensure the health and survival of populations of Gull-billed Terns and other piscivorous birds
- Conduct studies of demography to determine survival, fecundity, and the degree of metapopulation mixing among breeders at sites within the southern California - Baja California – northwestern Mexico region.

Monitoring Needs

Because of the Gull-billed Tern's small population size and limited nesting sites, censuses should be conducted on an annual basis. Such censuses should be conducted from outside colonies to minimize chances of colony abandonment, since this species shows poor site fidelity. Surveys of known and potential breeding locations in Mexico should be performed at 3 year intervals.

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Literature Cited

American Ornithologists' Union. 1957. Check-List of North American Birds. 5th edition. American Ornithologist's Union, Washington, D. C.

American Ornithologists' Union. 1998. Check-List of North American Birds. 7th edition. American Ornithologist's Union, Washington, D. C.

Bancroft, G. 1929. A new Pacific race of Gull-billed Tern. Trans. San Diego Soc. Nat. Hist. 19.

Blake, E. R. 1977. Manual of Neotropical Birds, Vol. 1. University of Chicago Press, Chicago, IL.

California Department of Fish and Game. 1992. Bird species of special concern. Unpubl. list, July 1992. Calif. Dept. Fish and Game, 1416 Ninth St., Sacramento, CA 95814.

Clapp, R. B., Buckley, P. A., and Buckley, F. G. 1993. Conservation of temperate North Pacific terns. Pp. 154-163 *in* The status, ecology, and conservation of marine birds of the North Pacific. Vermeer, K., Briggs, K. T., Morgan, K. H., and Siegel-Causey, D., eds. Can. Wildl. Spec. Publ., Ottawa.

Cramp, S (ed.). 1985. The Birds of the Western Palearctic, Vol. IV. Oxford University Press.

Danemann, G. D. and Carmona, R. 2000. Breeding birds of the Guerrero Negro saltworks, Baja California Sur, Mexico. Western Birds 31: 195-199.

Erwin, R. M. 1980. Breeding habitat use by colonially nesting waterbirds in two mid-Atlantic U. S. regions under different regimes of human disturbance. Biological Conservation 18: 39-51.

Erwin, R. M., Nichols, J. D., Eyler, T. B., Stotts, D. B., and Truitt, B. R. 1998. Modeling colony-site dynamics: a case study of Gull-billed Terns (*Sterna nilotica*) in coastal Virginia. Auk 115: 970-978.

Everett, W. T. and Anderson, D. W. 1991. Status and conservation of the breeding seabirds on offshore Pacific islands of Baja California and the Gulf of California. Pp. 115-139 *in* Seabird status and conservation: a supplement (J. P. Croxal, ed). International Council of Bird Preservation Tech. Publ. No. 11.

Fasola, M. and Canova, L. 1992. Nest habitat selection by eight syntopic species of Mediterranean gulls and terns. Colonial Waterbirds 15: 169-291.

Garrett, K. and Dunn, J. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Soc., Los Angeles, CA.

Gochfeld, M. and Burger, J. 1996. Family Sternidate (Terns). Pp 624-667 *in* del Hoyo, J., Elliott, A., and Sargatal, J., eds. Handbook of the Birds of the World, Vol. III, Hoatzin to Auks. Lynx Edicions, Barcelona.

Grinnell, J., and Miller, A. H. 1994. The distribution of the birds of California. Pac. Coast Avifauna 27.

Marchant, S. 1958. The birds of the Santa Elena Peninsula, S. W. Ecuador. Ibis 100: 349-387.

Massey, B. W. and Palacios, E. 1994. Avifauna of the wetlands of Baja California, Mexico: current status. Studies in Avian Biology No.15: 45-57.

Molina, K. C. 2000. Breeding populations of Gull-billed Terns (*Sterna nilotica vanrossemi*) in southern California, 2000. Contract No. 101810M393, final rept. to U. S. Fish and Wildlife Service, 2730 Loker Avenue West, Carlsbad, CA 92008.

Molina, K. C. and Garrett, K. L. 2001. The breeding birds of the Cerro Prieto Geothermal Ponds, Mexicali Valley, Baja California. Monographs in Field Ornithology, No. 3. American Birding Association.

Moller, A. P. 1981. Breeding cycle of the Gull-billed Tern (*Gelochelidon nilotica*) especially in relation to colony size. Ardea 69: 193-198.

Palacios, E. and Mellink, E. 1993. Additional records of breeding birds from Montague Island, northern Gulf of California. Western Birds 24:259-262.

Parnell, J. F., R. M. Erwin, and K. C. Molina. 1995. Gull-billed Tern (*Sterna nilotica*). *In* The Birds of North America, No. 140. (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologists' Union, Washington, D. C.

Patten, M. A., McCaskie, G., and Unitt, P. In press. The Birds of the Salton Sea: status, biogeography and taxonomy. University of California Press.

Patton, R. 1999. The status of California Least Terns and breeding waterbirds at south San Diego Bay National Wildlife Refuge in 1999. Final rept. to U. S. Fish and Wildlife Service. San Diego National Wildlife Refuge Complex, 2736 Loker Avenue West, Carlsbad, CA 92008.

Pemberton, J. R. 1927. The American Gull-billed Tern breeding in California. Condor 29: 253-258.

Peters, J. L. 1934. Check-list of the Birds of the World. Harvard University Press, Cambridge, MA.

Remsen, Jr. J. V. 1978. Bird Species of Special Concern in California. California Department of Fish and Game. Nongame Wildlife Investigations, Wildlife Management Branch Administrative Report No. 78-1.

Russell, S. M. and Monson, G. 1998. The Birds of Sonora. University of Arizona Press, Tucson.

Sauer, J. R., Hines, J. E., Thomas, I., Fallon, J., and Gough, G. 2000. The North American Breeding Bird Survey, results and analysis 1966-1999. Version 98.1, USGS Patuxent Wildl. Res. Ctr., Laurel MD (http://www.mbr-pwrc.usgs.gov/bbs/bbs.html).

Van Rossem, A. J. 1945. A distributional study of the birds of Sonora, Mexico. Louisiana State University, Museum of Zoology Occasional Papers No. 21.